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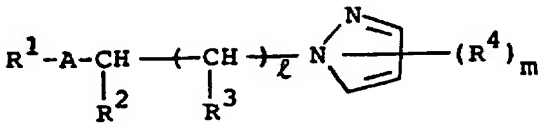
(54) Pyrazole compounds, and their production and use.

(57) A pyrazole compound of the formula:



, which is useful as a pesticide.

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PYRAZOLE COMPOUNDS, AND THEIR PRODUCTION AND USE

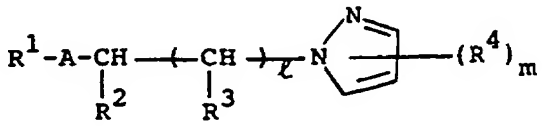
The present invention relates to pyrazole compounds, and their production and use.

Organophosphorus insecticides, organochlorinated insecticides, carbamate insecticides, etc. have made a great contribution in prevention and extermination of pests. Some of these insecticides, however, produce a high toxicity. Further, their residual effect causes sometimes unfavorable abnormality in the ecosystem of living things. Furthermore, resistance to those insecticides is noticed in house flies, planthoppers, leafhoppers, rice borers, etc.

As the pesticide having a juvenile hormone-like activity, there is known "methoprene" (U.S. patent 3,904,662). Further, Canadian patent 1,231,945 and EP-A1-0287959 disclose certain compounds having a juvenile hormone-like activity. However, the pesticidal activity of those compounds is not always satisfactory.

As a result of the extensive study, it has now been found that some pyrazole compounds exert a noticeable juvenile hormone-like activity and produce a remarkable pesticidal effect against pests belonging to Diptera, Hemiptera, Coleoptera, Lepidoptera, Orthoptera, Blattaria, Thysanoptera, Siphonaptera, Isoptera, etc. in agricultural fields, forest lands, granaries, stored products, sanitary facilities, etc. at low concentrations. This invention is based on the above finding.

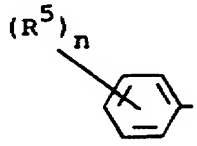
The pyrazole compounds of the invention are representable by the formula:



(I)

wherein

R^1 is a C_1-C_8 alkyl group, a C_2-C_8 alkenyl group or a C_3-C_8 alkynyl group, these groups being optionally substituted with halogen, hydroxy and/or C_1-C_6 alkoxy, or a group of the formula:

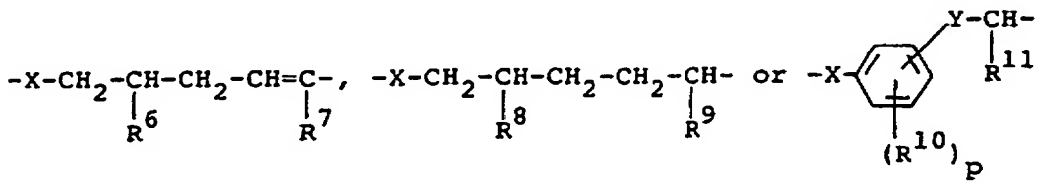


wherein R^5 is a hydrogen atom, a halogen atom, a hydroxy group, a cyano group, a nitro group, a C_1-C_4 alkyl group, a halo(C_1-C_4)alkyl group, a C_1-C_4 alkoxy group, a halo(C_1-C_4)alkoxy group, a C_1-C_4 alkylthio group, a halo(C_1-C_4)alkylthio group, a C_2-C_4 alkenyl group, a C_2-C_4 alkynyl group, a C_2-C_4 alkenyloxy group, a C_2-C_4 alkynyloxy group, a C_2-C_4 alkenylthio group, a C_2-C_4 alkynylthio group, a halo(C_2-C_4)alkenyl group, a halo(C_2-C_4)alkynyl group, a halo(C_2-C_4)alkenyloxy group, a halo(C_2-C_4)alkynyloxy group or a halo(C_2-C_4)alkenylthio group and n is an integer of 1 to 5;

R^2 and R^3 are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group;

R^4 is a hydrogen atom, a halogen atom, a C_1-C_4 alkyl group or a halo(C_1-C_4)alkyl group;

A is either one of the formulas:



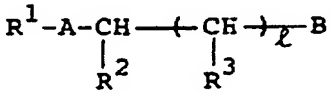
wherein R^6, R^7, R^8, R^9, R^{10} and R^{11} are, the same or different, each a hydrogen atom, a halogen atom or a

C_1-C_3 alkyl group, X is an oxygen atom, a sulfur atom, a methylene group, a carbonyl group, a sulfoxide group, a sulfonyl group or a single bond, Y is an oxygen atom, a sulfur atom or a methylene group and p is an integer of 1 to 4;

ℓ is an integer of 0 to 2; and

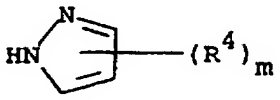
m is an integer of 1 to 3.

The pyrazole compound (1) can be produced, for instance, by reacting a compound of the formula:



(II)

wherein R^1, R^2, R^3, A and ℓ are each as defined above and B is a halogen atom, a mesyloxy group or a tosyloxy group with a compound of the formula:



(III)

wherein R^4 and m are each as defined above in the presence of an acid-eliminating agent.

The above reaction may be carried out in the presence or absence of an inert solvent, of which preferred examples are dimethylformamide, dimethylsulfoxide, tetra hydrofuran, toluene, dimethoxyethane, dimethylacetamide, etc. As the acid-eliminating agent, there may be employed an alkali metal, an alkali metal hydride, an alkali metal amide, an alkali metal hydroxide, an alkali metal carbonate, an organic base (e.g. 4-dimethylaminopyridine), etc. For acceleration of the reaction, a phase transfer catalyst such as benzyltriethylammonium chloride, tetra-n-butylammonium bromide or tris(3,6-dioxaheptyl)amine may be present in the reaction. In this instance, water can be used as the reaction medium.

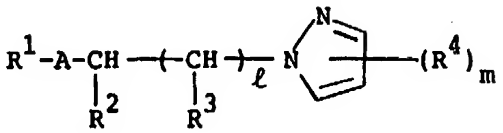
The reaction is normally achieved at a temperature of about -30° C to 200° C, preferably of about 0° C to 110° C, for about a period of 0.5 to 30 hours. The molar ratio of the compounds (II) and (III) is usually about 1 : 0.1 - 10 moles, preferably about 1 : 0.8 - 1.2 moles.

Upon completion of the reaction, the reaction mixture is subjected to ordinary post treatment such as extraction with an organic solvent and concentration. When desired, purification by chromatography, distillation, recrystallization or the like may be carried out.

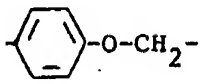
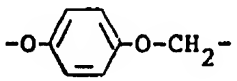
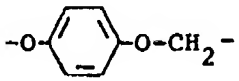
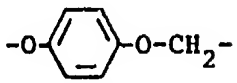
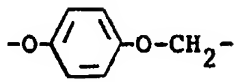
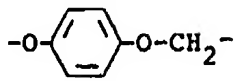
The pyrazole compounds (I) of the invention include optical isomers and geometrical isomers with respect to R^2, R^3, R^6, R^7, R^8, R^9 and/or R^{11}. All of these isomers are included within the scope of the invention.

Representative examples of the pyrazole compounds (I) obtainable by the above procedure are shown in Table 1.

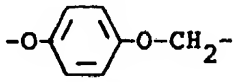
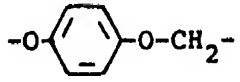
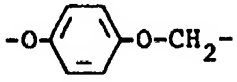
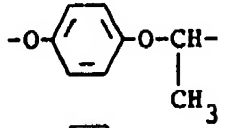
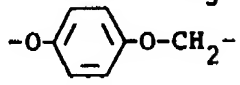
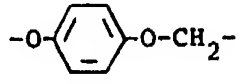
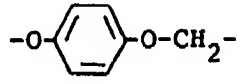
Table 1



(I)

R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$
$CH_3-CH(CH_3)-O-CH_2-$		$-CH_2-CH_2-$	H
		$-CH(Cl)-CH_2-$	H
		$-CH(F)-CH_2-$	H
$Cl-CH_2-(CH_2)_2-$		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	$3-C_2H_5$
$CH\equiv C-CH_2-$		$-CH_2-CH_2-$	H

(Continued)

R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$
		$-CH(C_2H_5)-CH_2-$	H
		$-CH_2-CH_2-$	3-CF_3
$CH_3-CH(CH_3)-CH_2-$	$-(CH_2)_2-CH(CH_3)-CH_2-CH=CH-$	$-CH_2-CH_2-$	H
		$-CH_2-$	3-CH_3
		$-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-CH_2-CH_2-$	H

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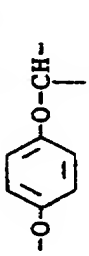
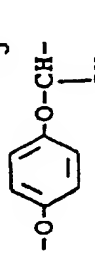
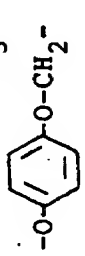
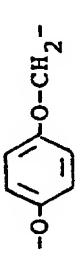
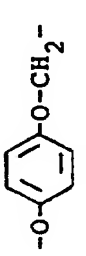
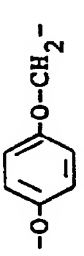
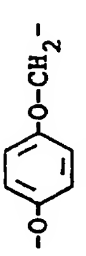
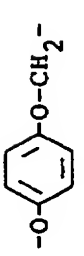
(Continued)

R^1	A	$-CH-\left(CH\right)_{\overline{\ell}}$ R^2 R^3	$(R^4)_m$
		$-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH(CH_3)-CH_2-$	H
		$-CH_2-CH(CH_3)-$	H
		$-CH_2-CH_2-$	3-CH_3
		$-CH_2-CH_2-$	4-CH_3
		$-CH_2-CH_2-$	4-Cl
		$-CH_2-CH_2-$	3,5-$(CH_3)_2$

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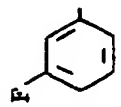
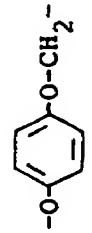
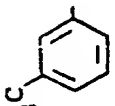
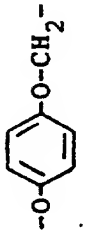
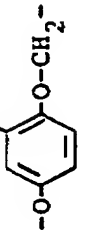
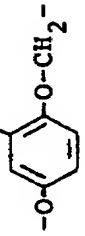
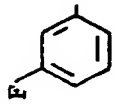
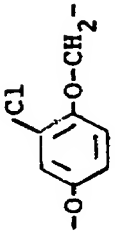
R^1	A	$-CH-\left(CH\right)_{\ell}-$ $R^2 \quad R^3$	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-CH_2-$	H

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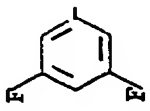
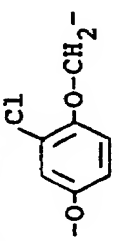
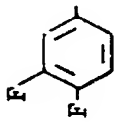
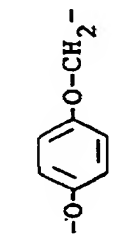
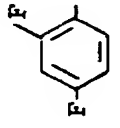
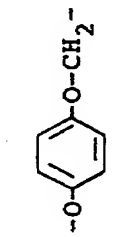
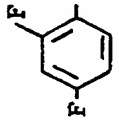
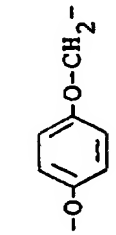
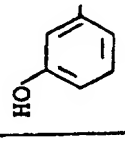
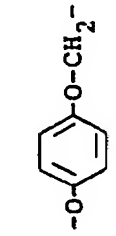
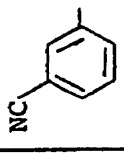
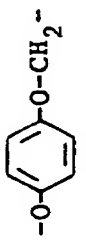
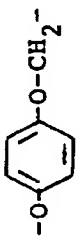
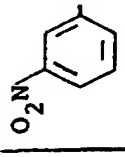
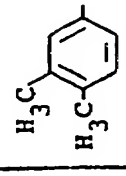
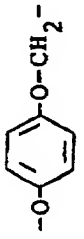
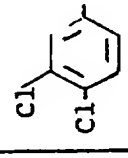
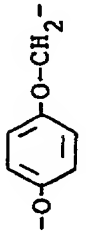
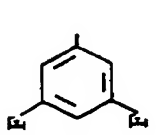
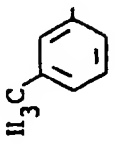
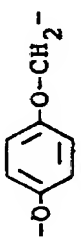
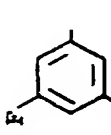
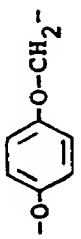
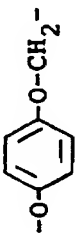
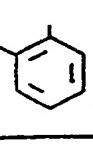
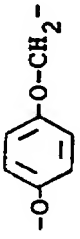
R^1	A	$-CH-\left(CH\right)_{\ell}-$ (R^2, R^3)	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-CH_2-$	H

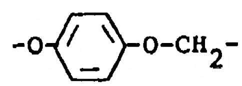
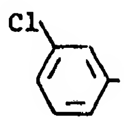
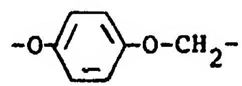
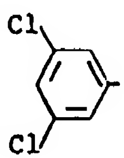
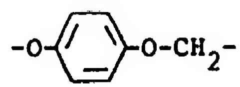
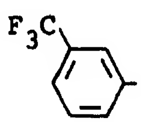
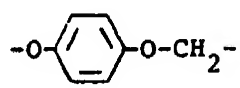
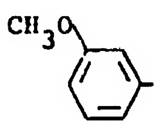
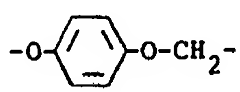
(Continued)

R^1	A	$-CH-\left(CH\right)_{\ell}-$ R^2 R^3	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H

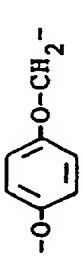
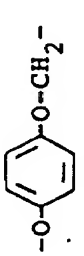
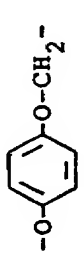
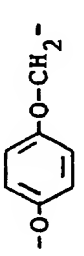
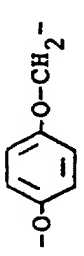
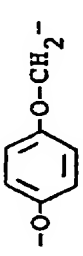
(Continued)

R^1	A	$-CH-\left(CH\right)_{\overline{\ell}}$ (R^2, R^3)	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-$	H
		$-CH_2-CH_2-$	H

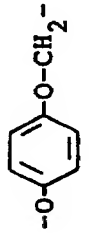
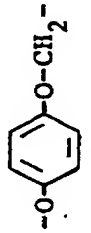
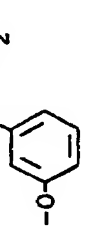
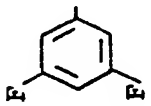
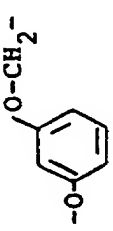
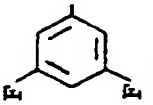
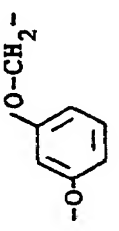
(Continued)

R^1	A	$-\underset{R^2}{CH}-(\underset{R^3}{CH})_\ell-$	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H

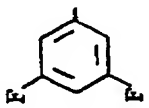
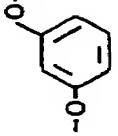
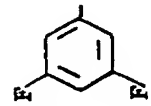
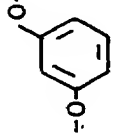
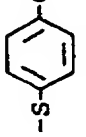
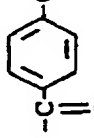
(Continued)

R^1	A	$-CH\left(CH\right)_{\ell}$ R^2 R^3	$(R^4)_m$
CF_2HO	-O- 	$-CH_2-CH_2-$	H
	-O- 	$-CH_2-CH_2-$	H
	-O- 	$-CH_2-CH_2-$	H
$CH_2=CHCH_2O$	-O- 	$-CH_2-CH_2-$	H
$HC\equiv CCH_2O$	-O- 	$-CH_2-CH_2-$	H
CH_3S 	-O- 	$-CH_2-CH_2-$	H

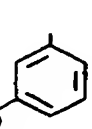
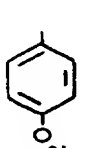
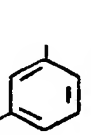
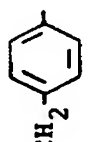
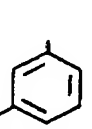
(Continued)

R^1	A	$-CH-\left(CH\right)_{\overline{\ell}}$ R^2 R^3	$(R^4)_m$
C_2H_5		$-CH_2-CH_2-$	H
$n-C_3H_7$		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-$	H

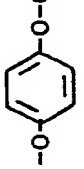
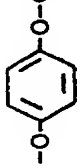
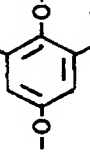
(Continued)

R^1	A	$-CH-\left(CH\right)_{\overline{\ell}}$ R^2 R^3	$(R^4)_m$
		$-CH-CH_2-$ CH_3	H
		$-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-$	H

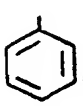
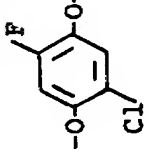
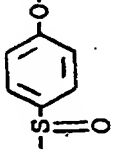
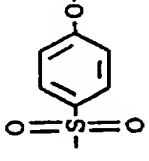
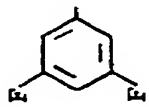
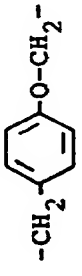
(Continued)

R^1	A	$-CH-\underset{R^2}{}-CH-\underset{R^3}{}-$	$(R^4)_m$
$(CH_3)_2CHO$		$-CH_2-CH_2-$	H
CF_2HCF_2O		$-CH_2-CH_2-$	H
CF_2HCF_2S		$-CH_2-CH_2-$	H
$CH_2=CHCH_2$		$-CH_2-$	H
$HC\equiv CCH_2S$		$-CH_2-$	H
C_2H_5-CH- C_2H_5		$-CH_2-CH_2-$	H

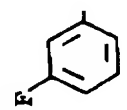
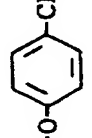
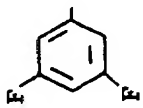
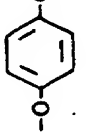
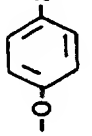
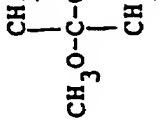
(Continued)

R^1	A	$-CH-\left(-CH\right)_{\ell}-$ (R^2, R^3)	$(R^4)_m$
C_2H_5-CH- (C_2H_5)		$-CH_2-$	H
$CH_3-CH-CH_2-$ (CH_3)		$-CH_2-CH_2-$	H
OH, CH_3-C-CH_2- (CH_3)		$-CH_2-CH_2-$	H
$NC-CH_2-$		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H

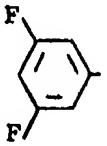
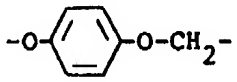
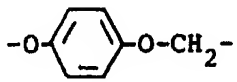
(Continued)

R^1	A	$-CH-\left(CH\right)_{\ell}$ R^2 R^3	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H

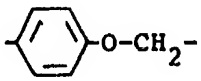
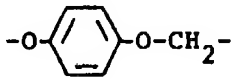
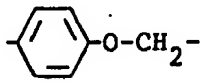
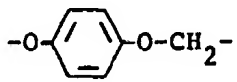
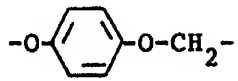
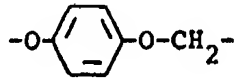
(Continued)

R^1	A	$-CH-(-CH-)_\ell$ (R^2, R^3)	$(R^4)_m$
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
	$-(CH_2)_2-CH-(CH_2)_3-$	$-CH_2-CH_2-$	H
	$-(CH_2)_2-CH-(CH_2)_3-$	$-CH_2-CH_2-$	H

(Continued)

R^1	A	$-CH(R^2)-CH(R^3)-_{\ell}$	$(R^4)_m$
$CH_3-CH(CH_3)-CH_2-$	$-(CH_2)_2-CH(CH_3)-(CH_2)_3-$	$-CH_2-CH_2-$	H
$CH_3-CH(CH_3)-CH_2-$	$-(CH_2)_6-$	$-CH_2-CH_2-$	H
	$-O-(CH_2)_5-$	$-CH_2-CH_2-$	H
	$-O-(CH_2)_5-$	$-CH_2-CH_2-$	H
$CH_3-CH(CH_3)-CH_2-$		$-CH_2-CH_2-$	H
$CH_3-C(CH_3)_2-CH_2-$		$-CH_2-CH_2-$	H

(Continued)

R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$
$CH_3-C(CH_3)_2-CH_2-$		$-CH_2-CH_2-$	H
$C_2H_5-CH(CH_3)-CH_2-$		$-CH_2-CH_2-$	H
$C_2H_5-CH(CH_3)-CH_2-$		$-CH_2-CH_2-$	H
$CH_2=C(CH_3)-CH_2-$		$-CH_2-CH_2-$	H
$CH_3-CH(CH_3)-(CH_2)_2-$		$-CH_2-CH_2-$	H
$CH_2=CH-CH_2-$		$-CH_2-CH_2-$	H

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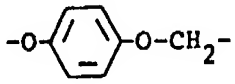
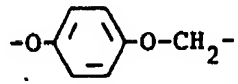
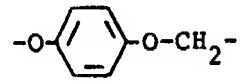
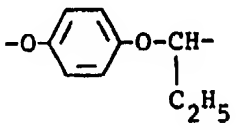
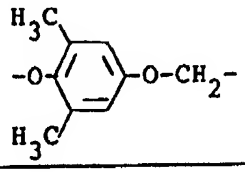
(Continued)

R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$
$CH_2=C(Cl)-CH_2-$		$-CH_2-CH_2-$	H
$CH_3-C(CH_3)_2-(CH_2)_2-$		$-CH_2-CH_2-$	H
$CH_3-(CH_2)_4-$		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
$CH_3-CH(CH_3)-(CH_2)_2-$		$-CH_2-CH_2-$	H

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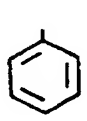
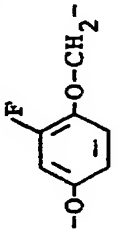
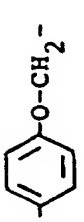
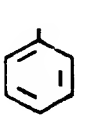
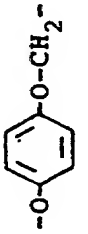
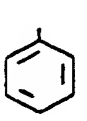
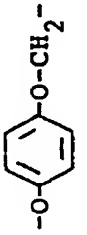
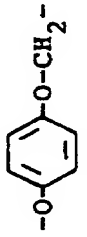
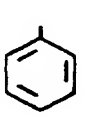
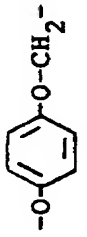
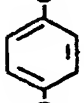
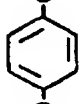
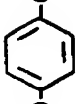
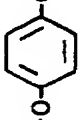
(Continued)

R^1	A	$-CH-\left(CH\right)_{\ell}$ R^2 R^3	$(R^4)_m$
		$-CH_2-CH_2-$	H
$CH_3-CH-O-CH_2-$ CH_3		$-CH_2-CH_2-$	H
		$-CH-CH_2-$ Cl	H
		$-CH-CH_2-$ F	H
$ClCH_2-(CH_2)_2-$		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	$3-C_2H_5$

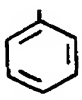
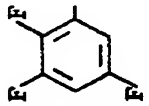
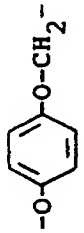
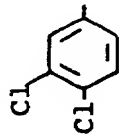
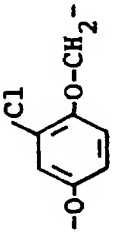
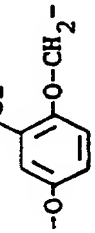
(Continued)

R^1	A	$-CH-(-CH-)_{\overline{2}}$ R^2 R^3	$(R^4)_m$
$CH\equiv C-CH_2-$		$-CH_2-CH_2-$	H
		$-CH(C_2H_5)-CH_2-$	H
		$-CH_2-CH_2-$	$3-CF_3$
$CH_3-CH(CH_3)-CH_2-$	$-(CH_2)_2-CH(CH_3)-CH_2-CH=CH-$	$-CH_2-CH_2-$	H
		$-CH_2-$	$3-CH_3$
		$-CH(CH_3)-$	H
$CH_2=CHCH_2S-$ 		$-CH_2-CH_2-$	H

(Continued)

R^1	A	$-CH-(-CH-)_\ell$ (R² / R³)	$(R^4)_m$
$CH_3C\equiv C-$	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
$CH_2=CCH_2-$ (Cl)	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
$ClCH_2CH_2C\equiv C-$	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
$CH_2=CCH_2O-$ (Cl)	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
$CH\equiv CCHO-$ (CH_2F)	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
$CH_2=CCH_2S-$ (Cl)	-O-  $-O-CH_2-$	$-CH_2-CH_2-$	H
	$-O-(CH_2)_3-CH=CH-$	$-CH_2-CH_2-$	H

(Continued)

R^1	A	$-CH-(CH)_{\ell}-$ (R^2, R^3)	$(R^4)_m$
	$-S-(CH_2)_5-$	$-CH_2-CH_2-$	H
	$-O-(CH_2)_3-CH=C-$ (CH_3)	$-CH_2-CH_2-$	H
	$-O-(CH_2)_3-CH=C-$ (F)	$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H
		$-CH_2-CH_2-$	H

Practical and presently preferred embodiments for preparation of the pyrazole compounds (I) are illustratively shown in the following examples.

Example 1

To a mixture of anhydrous N,N-dimethylformamide (5 ml) and sodium hydride (60 % oil suspension; 39 mg), pyrazole (66 mg) was added, and the resultant mixture was stirred for 30 minutes. A solution of 3-(4-phenoxyphenoxy)propyl bromide (300 mg) in anhydrous N,N-dimethylformamide (5 ml) was dropwise added thereto, followed by stirring at room temperature for 5 hours. The reaction mixture was diluted with ethyl acetate (50 ml), washed with a saturated aqueous ammonium chloride solution two times, dried over anhydrous magnesium sulfate and concentrated under reduced pressure. The oily substance thus obtained was subjected to column chromatography to give 246 mg of 1-[3-(4-phenoxyphenoxy)propyl]pyrazole as a colorless oil.

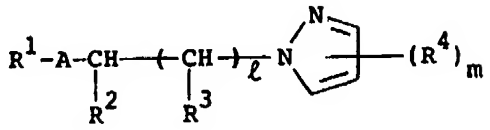
$n_D^{23.5}$ 1.5777.

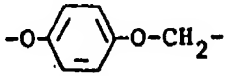
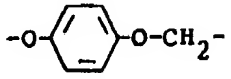
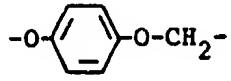
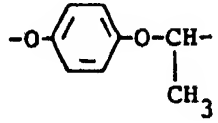
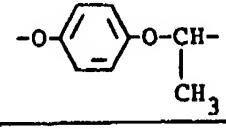
Example 2

To a mixture of anhydrous dimethylsulfoxide (5 ml) and sodium hydride (60 % oil suspension; 62 mg), pyrazole (106 mg) was added, and the resultant mixture was stirred for 30 minutes. A solution of 3-[4-(3-tolyloxy)phenoxy]propyl bromide (500 mg) in anhydrous dimethylsulfoxide (5 ml) was dropwise added thereto, followed by stirring at room temperature for 3 hours. The reaction mixture was treated in the same manner as in Example 1 to give 347 mg of 1-{3-[4-(3-tolyloxy)phenoxy]propyl}pyrazole as a colorless oil. $n_D^{23.7}$ 1.5738.

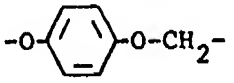
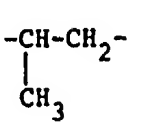
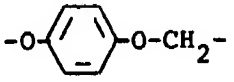
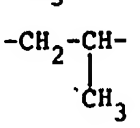
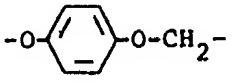
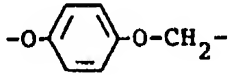
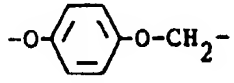
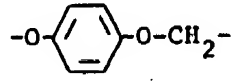
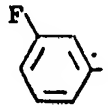
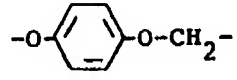
In the same manner as above, there were prepared the pyrazole compounds (I), of which typical examples are shown in Table 2.

Table 2



Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
1			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5777
2			$-CH_2-$	H	m.p., 59.7°C
3			$-CH_2-CH_2-CH_2-$	H	$n_D^{24.7}$ 1.5731
4			$-CH_2-$	H	$n_D^{23.7}$ 1.5805
5			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5799

(Continued)

Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
6				H	$n_D^{24.5}$ 1.5795
7				H	$n_D^{24.3}$ 1.5801
8			$-CH_2-CH_2-$	$3-CH_3$	$n_D^{24.5}$ 1.5705
9			$-CH_2-CH_2-$	$4-CH_3$	$n_D^{23.5}$ 1.5691
10			$-CH_2-CH_2-$	4-Cl	$n_D^{24.3}$ 1.5825
11			$-CH_2-CH_2-$	$3,5-(CH_3)_2$	$n_D^{25.3}$ 1.5648
12			$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5761

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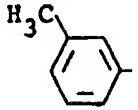
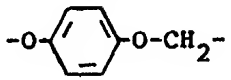
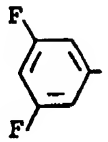
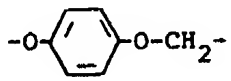
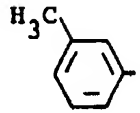
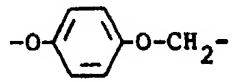
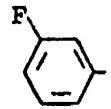
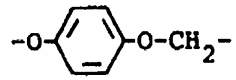
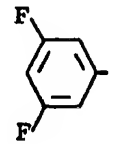
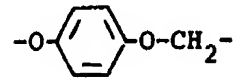
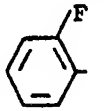
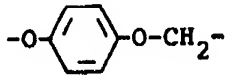
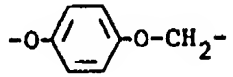
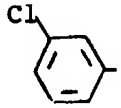
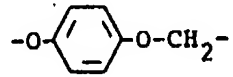
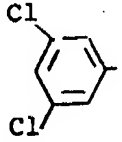
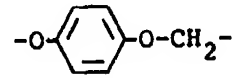
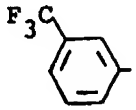
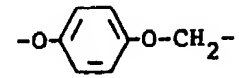
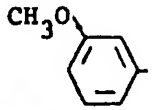
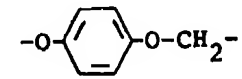
(Continued)

Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
13			$-CH_2-CH_2-$	H	$n_D^{23.7}$ 1.5738
14			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5746
15			$-CH_2-$	H	$n_D^{23.8}$ 1.5793
16			$-CH_2-$	H	$n_D^{23.7}$ 1.5802
17			$-CH_2-$	H	$n_D^{23.3}$ 1.5798

(Continued)

Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
18			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5775
19			$-CH_2-CH_2-$	H	$n_D^{24.1}$ 1.5765
20			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5786
21			$-CH_2-CH_2-$	H	$n_D^{24.3}$ 1.5794
22			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5631
23			$-CH_2-CH_2-$	H	$n_D^{24.3}$ 1.5772

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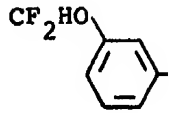
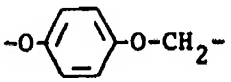
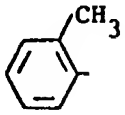
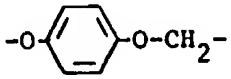
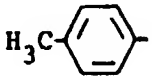
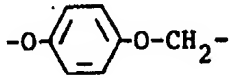
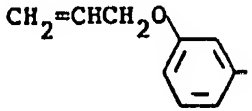
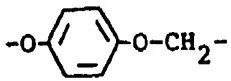
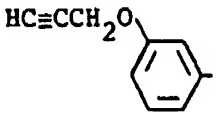
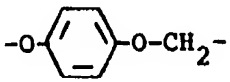
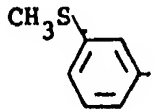
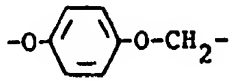
Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
24			$-CH_2-CH_2-$	H	$n_D^{24.0}$ 1.5649
25			$-CH_2-CH_2-$	H	$n_D^{24.0}$ 1.5769
26			$-CH_2-CH_2-$	H	$n_D^{23.4}$ 1.5761
27			$-CH_2-CH_2-$	H	$n_D^{24.0}$ 1.5815
28			$-CH_2-CH_2-$	H	$n_D^{23.4}$ 1.5796
29			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5850

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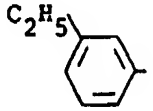
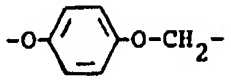
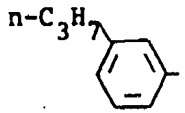
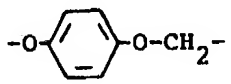
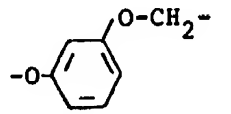
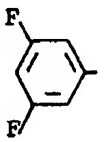
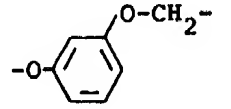
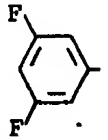
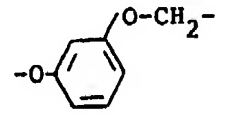
Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
30			$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5756
31			$-CH_2-CH_2-$	H	$n_D^{24.1}$ 1.5765
32			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5781
33			$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5786
34			$-CH_2-$	H	$n_D^{24.1}$ 1.5803

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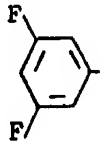
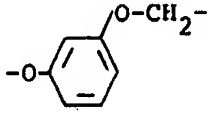
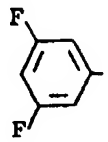
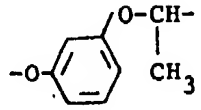
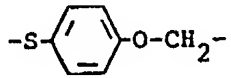
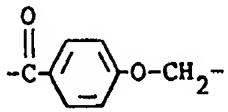
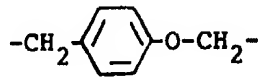
Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
35			$-CH(CH_3)-CH_2-$	H	$n_D^{24.0}$ 1.5795
36			$-CH_2-$	H	$n_D^{24.5}$ 1.5812
37			$-CH_2-CH_2-$	H	$n_D^{25.0}$ 1.5860
38			$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5798
39			$-CH_2-CH_2-$	H	$n_D^{24.7}$ 1.5781

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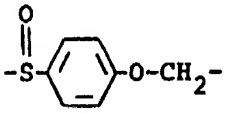
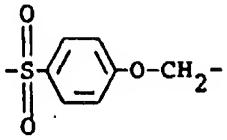
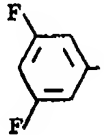
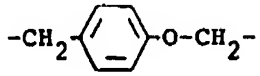
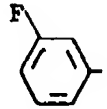
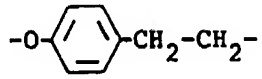
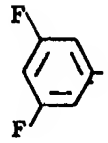
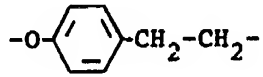
Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
40			$-CH_2-CH_2-$	H	$n_D^{25.1}$ 1.5881
41			$-CH_2-CH_2-$	H	$n_D^{24.7}$ 1.5834
42			$-CH_2-CH_2-$	H	$n_D^{24.8}$ 1.5773
43			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5726
44			$-CH_2-CH_2-$	H	$n_D^{24.6}$ 1.5745

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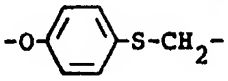
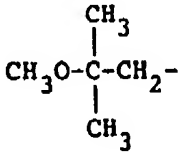
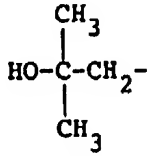
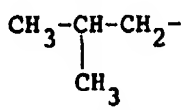
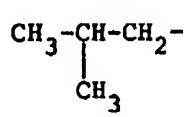
Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
45			$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5817
46		$-(CH_2)_2-CH(CH_3)-(CH_2)_3-$	$-CH_2-CH_2-$	H	$n_D^{24.1}$ 1.4796
47		$-(CH_2)_2-CH(CH_3)-(CH_2)_3-$	$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.4731
48		$-(CH_2)_2-CH(CH_3)-(CH_2)_3-$	$-CH_2-CH_2-$	H	$n_D^{24.4}$ 1.4705
49		$-(CH_2)_6-$	$-CH_2-CH_2-$	H	$n_D^{24.7}$ 1.4746
50		$-O-(CH_2)_5-$	$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5325

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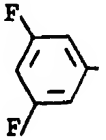
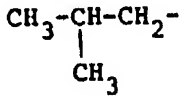
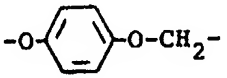
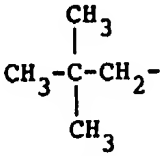
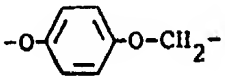
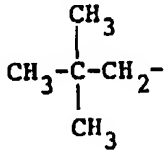
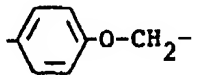
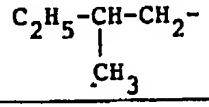
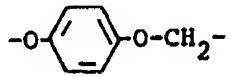
Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
51		$-O-(CH_2)_5-$	$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5331
52			$-CH_2-CH_2-$	H	$n_D^{25.5}$ 1.5306
53			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5310
54			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5315
55			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5313

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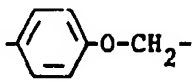
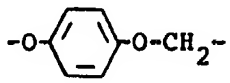
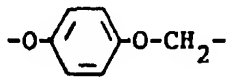
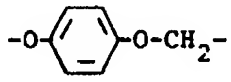
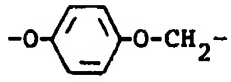
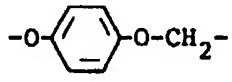
Compound No.	R^1	A	$-CH(R^2)-(CH(R^3))_\ell-$	$(R^4)_m$	Physical constant
56	$C_2H_5-C(CH_3)-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{24.4}$ 1.5319
57	$CH_2=C(CH_3)-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{23.7}$ 1.5340
58	$CH_3-CH(CH_3)-(CH_2)_2-$		$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5321
59	$CH_2=CH-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{24.0}$ 1.5329
60	$CH_2=C(Cl)-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5356
61	$CH_3-C(CH_3)_2-(CH_2)_2-$		$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5310

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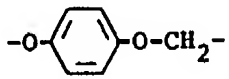
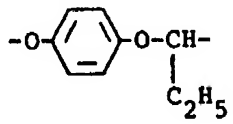
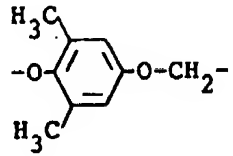
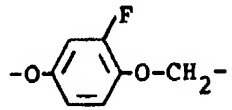
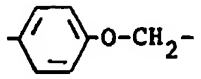
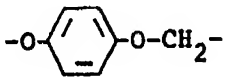
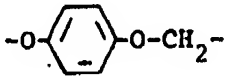
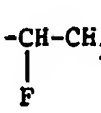
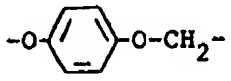
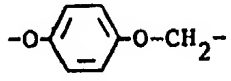
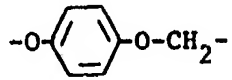
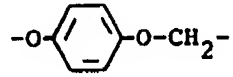
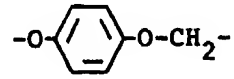
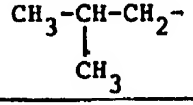
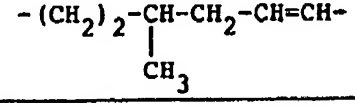
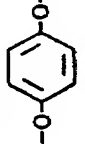
Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-$	$(R^4)_m$	Physical constant
62	$CH_3-(CH_2)_4-$		$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5301
63			$-CH_2-CH_2-$	H	$n_D^{24.7}$ 1.5799
64	$CH_3-CH(CH_3)-(CH_2)_2-$		$-CH_2-CH_2-$	H	$n_D^{24.1}$ 1.5351
65			$-CH_2-CH_2-$	H	$n_D^{24.2}$ 1.5775
66	$CH_3-CH(CH_3)-O-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.5306
67			$-CH(Cl)-CH_2-$	H	$n_D^{24.5}$ 1.5781

(Continued)

Compound No.	R^1	A	$-CH(R^2)-CH(R^3)-_\ell$	$(R^4)_m$	Physical constant
68				H	$n_D^{24.5}$ 1.5779
69	$Cl-CH_2-(CH_2)_2-$		$-CH_2-CH_2-$	H	$n_D^{23.5}$ 1.5364
70			$-CH_2-CH_2-$	$3-C_2H_5$	$n_D^{25.0}$ 1.5698
71	$CH\equiv C-CH_2-$		$-CH_2-CH_2-$	H	$n_D^{24.1}$ 1.5360
72				H	$n_D^{23.5}$ 1.5797
73			$-CH_2-CH_2-$	$3-CF_3$	$n_D^{25.1}$ 1.5717
74			$-CH_2-CH_2-$	H	$n_D^{24.5}$ 1.4726

(Continued)

Compound No.	R^1	A	$-CH-\left(CH\right)_{\overline{\ell}}$ $\quad R^2 \quad R^3$	$(R^4)_m$	Physical constant
75			$-CH_2-$	3-CH_3	$n_D^{24.3}$ 1.5790
76			$-CH_2-$	H	$n_D^{24.0}$ 1.5781

On the application of the pyrazole compound (I) as a pesticide, it may be used as such or in an appropriate preparation form such as an oil spray, an emulsifiable concentrate, a wettable powder, granules, a dust, an aerosol, a fogging agent, a toxic bait, etc. In those preparations, the pyrazole compound (I) is usually contained in about 0.1 to about 99.9 % by weight, preferably in about 2 to about 80 % by weight.

Said preparation can be formulated in a per se conventional manner by mixing at least one of the pyrazole compounds (I) with an appropriate solid, liquid or gaseous carrier(s) or diluent(s) or a bait. An appropriate adjuvant(s) such as a surfactant, an adherent, a dispersant or a stabilizer may be also mixed therein for improving the dispersibility and other properties of the preparation.

Examples of the solid carriers or diluents are fine powders or granules of clays (e.g. kaolin clay, diatomaceous earth, synthetic hydrated silica, bentonite, fubasami clay, terra alba), talcs, ceramics, other inorganic minerals (e.g. sericite, quartz, sulfur, active carbon, calcium carbonate, hydrated silica), chemical fertilizers (e.g. ammonium sulfate, ammonium phosphate, ammonium nitrate, urea, ammonium chloride), etc. Examples of the liquid carriers or diluents are water, alcohols (e.g. methanol, ethanol), ketones (e.g. acetone, methylethylketone), aromatic hydrocarbons (e.g. benzene, toluene, xylene, ethylbenzene, methylnaphthalene), aliphatic hydrocarbons (e.g. hexane, cyclohexane, kerosene, light oil), esters (e.g. ethyl acetate, butyl acetate), nitriles (e.g. acetonitrile, isobutyronitrile), ethers (e.g. diisopropyl ether, dioxane), acid amides (e.g. N,N-dimethylformamide, N,N-dimethylacetamide), halogenated hydrocarbons (e.g. dichloromethane, trichloroethane, carbon tetrachloride), dimethylsulfoxide, botanical oils (e.g. soybean oil, cotton-seed oil), etc. Examples of the gaseous carriers or diluents are Freon gas, butane gas, LPG (liquefied petroleum gas), dimethyl ether, carbon dioxide, etc.

The surfactants usable for emulsification, dispersion or spreading may be any of ionic and non-ionic types. Their examples are alkylsulfates, alkylarylsulfonates, dialkylsulfosuccinates, polyoxyethylenealkylarylphosphates, condensates of naphthalenesulfonic acid and formalin, polyoxyethylene alkyl ethers, polyoxyethylene polyoxypropylene block copolymers, sorbitan fatty acid esters, polyoxyethylene sorbitan fatty acid esters, etc. Examples of the adherents or dispersants may include casein, gelatin, polyvalent alcohols (e.g. starch powder, gum arabic, cellulose derivatives, alginic acid), lignin derivatives, bentonite, saccharides, synthetic water-soluble high molecular compounds (e.g. polyvinyl alcohol, polyvinylpyrrolidone, polyacrylic acid), etc. As the stabilizers, there may be used alkyl phosphates (e.g. PAP (isopropyl acid phosphate), BHT (2,6-di-tert-butyl-4-methyl-phenol), BHA (a mixture of 2-tert-butyl-4-methoxyphenol and 3-tert-butyl-4-methoxyphenol), botanical oils, mineral oils, surfactants, aliphatic acids or esters, etc.

The base for toxic baits may comprise food (e.g. grain powders, essential oils, sugar, crystalline cellulose), an antioxidant (e.g. dibutylhydroxytoluene, butylhydroxyanisole, nordihydroguaiaretic acid), a preservative (e.g. dehydroacetic acid), a mis-feed inhibitor (e.g. red pepper powders), a flavoring agent (e.g. cheese flavor, onion flavor), etc.

The composition thus formulated may be applied as such or in a form of dilution with water. In addition, said composition may contain other insecticides, nematocides, acaricides, fungicides, herbicides, plant growth regulators, synergistic agents, fertilizers, soil improvers, etc. Particularly when employed in conjunction with conventional insecticides, a broad spectrum of activity or a more immediate effect on very heterogeneous populations is provided. Examples of the insecticides include organic phosphorus compounds (e.g. fenitrothion (O,O-dimethyl-O-(3-methyl-4-nitrophenyl)phosphorothioate), malathion (S-[1,2-bis(ethoxycarbonyl)ethyl] O,O-dimethylphosphorothioate), dimethoate (O,O-dimethyl-S-(N-methylcarbamoylmethyl)phosphorodithioate), salithion (2-methoxy-4H-1,3,2-benzodioxaphosphorin-2-sulfide), diazinon (O,O-diethyl-O-(2-isopropyl-6-methyl-4-pyrimidinyl)phosphorothioate), dipterex (2,2,2-trichloro-2-hydroxyethyl-O,O-dimethylphosphonate), dichlorvos (O-(2,2-dichlorovinyl)-O,O-dimethylphosphate), etc.), carbamate compounds (e.g. MPMC (3,4-dimethylphenyl N-methylcarbamate), MTMC (m-tolyl N-methylcarbamate), BPMC (2-sec-butylphenyl N-methylcarbamate), carbaryl (1-naphthyl N-methylcarbamate), etc.) and pyrethroid compounds (e.g. permethrin (3-phenoxybenzyl-*d,l*-cis,trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate), fenvalerate (α-cyano-m-phenoxybenzyl α-isopropyl-p-chlorophenylacetate), etc.).

The composition may be applied to pests by a conventional manner, of which typical examples are spreading, fuming, soil treatment, incorporation into food for domestic animals or poultry, etc. It is further noticeable that addition of the composition to sericiculture food may lead to an increase of cocoons in number or thickening the cocoon layer.

The dosage of the pyrazole compound (I) as the active ingredient in an agricultural pesticidal composition is generally from about 5 to about 500 grams per 100 ares. When the composition is applied as an emulsifiable concentrate or a wettable powder, the concentration of the active ingredient is normally from about 1 to about 500 ppm. In case of such formulation as granules, fine granules and dusts, the composition may be applied as such without diluting with water. As a sanitary pesticidal composition, the

composition in the form of an emulsifiable concentrate, an emulsifiable concentrate or a wettable powder may be diluted with water in a concentration of the active ingredient being generally from about 1 to about 500 ppm and applied. In case of the formulation such as an oil spray, an aerosol, a fumigant, a bait or the like, it may be applied as such.

Said amounts and concentrations are not decisive and may vary depending on the kind of preparation, season for application, locus to be applied, mode of application, species of pests, degree of damages, etc.

Some practical embodiments of the composition according to the invention are illustratively shown in the following Formulation Examples wherein % and part(s) are by weight and the compound numbers correspond to those in Table 2.

Formulation Example 1

One of Compound Nos. 1 to 76 (20 parts), an emulsifier (a mixture of polyoxyethylene styrylphenyl ether, polymer of polyoxyethylene styrylphenyl ether and alkylarylsulfonate) (20 parts) and xylene (60 parts) are mixed well to make a 20 % emulsifiable concentrate.

Formulation Example 2

One of Compound Nos. 1 to 76 (20 parts), an emulsifier (sodium laurylsulfate) (5 parts) and diatomaceous earth (#300 mesh; 75 parts) are mixed well in a pulverizer to make a 20 % wettable powder.

Formulation Example 3

One of Compound Nos. 1 and 2 (3 parts), acetone (20 parts) and talc (#300 mesh; 97 parts) are mixed well in a pulverizer, followed by removal of acetone by evaporation to make a 3 % dust.

Formulation Example 4

One of Compound Nos. 1 to 76 (5 parts), a dispersing agent (calcium ligninsulfonate) (2 parts) and clay (93 parts) are mixed well, followed by addition of a small amount of water. The resultant mixture is kneaded and granulated by the aid of a granulator and dried to make 5 % granules.

Formulation Example 5

Compound No. 1 (2 parts), a dispersing agent (calcium ligninsulfonate) (2 parts) and clay (96 parts) are mixed well, followed by addition of a small amount of water. The resultant mixture is kneaded and granulated by the aid of a fine granulator and dried to make 2 % fine granules.

Formulation Example 6

Compound No. 1 (0.2 parts), xylene (2 parts), dimethylformamide (2 parts) and lamp oil (95.8 parts) are mixed well to make an oil spray.

Formulation Example 7

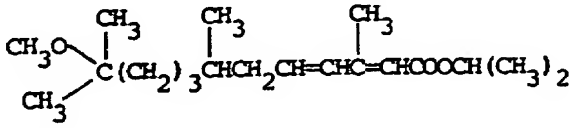
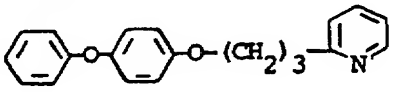
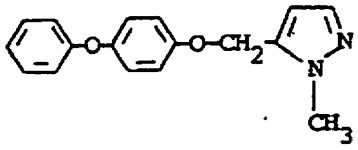
Compound No. 1 (0.05 part), tetramethrin (N-(3,4,5,6-tetrahydrophthalimido)methylchrysanthemate) (0.2 part), resmethrin (5-benzyl-3-furylmethyl) (±)-cis,transchrysanthemate) (0.05 part), xylene (7 parts) and deodorized lamp oil (42.7 parts) are mixed well and charged into an aerosol container. Upon attachment of a valve portion, a pressurizing agent (LPG) (50 parts) is charged through the valve to make an aerosol.

Formulation Example 8

Compound No. 1 (1 part) and sesame oil (3 parts) are mixed, and butyl hydroxyanisole (0.03 part), dehydroacetic acid (0.1 part), black sugar (10 parts), crystalline cellulose (30 parts) and potato starch (55.87 parts) are added thereto. The resultant mixture is uniformly mixed and pressurized with a load of 15 kg/cm^2 to make a toxic bait in tablets, each tablet having a weight of approx. 4 g and a diameter of 30 mm.

The following Test Examples present some typical test data indicating the excellent pesticidal activity of the pyrazole compounds (I). The compounds used for comparison are shown in Table 3 below:

Table 3

Compound No.	Structure	Remarks
(A)		Known as "methoprene"; U.S. patent 3,904,662
(B)		Canadian patent 1,231,945; Compound No. 118
(C)		EP-A1-287959; Compound No. 14-1

Test Example 1

An emulsifiable concentrate prepared according to Formulation Example 1 was diluted with water to make a 400 fold dilution. The dilution (0.7 ml) was added to 100 ml of distilled water. Last instar larvae of common mosquito (Culex pipiens pallens) were released therein and reared for 7 days until their emergence. The rate of emergence was observed with two replications. The results are shown in Table 4.

Table 4

Test compound No.	Concentration (ppm)	Rate of emergence (%)
1	3.5	0
2	3.5	0
3	3.5	0
4	3.5	0
5	3.5	0
6	3.5	0
7	3.5	0
8	3.5	0
9	3.5	0
10	3.5	0
11	3.5	0
12	3.5	0
13	3.5	0
14	3.5	0
15	3.5	0
16	3.5	0
17	3.5	0
18	3.5	0
19	3.5	0
20	3.5	0
21	3.5	0
22	3.5	0
23	3.5	0
24	3.5	0
25	3.5	0
26	3.5	0
27	3.5	0
28	3.5	0
29	3.5	0
30	3.5	0
31	3.5	0
32	3.5	0
33	3.5	0
34	3.5	0
35	3.5	0
36	3.5	0
37	3.5	0
38	3.5	0
39	3.5	0
40	3.5	0
41	3.5	0
42	3.5	0
43	3.5	0
44	3.5	0
45	3.5	0
46	3.5	0
47	3.5	0
48	3.5	0

(Continued)

Test compound No.	Concentration (ppm)	Rate of emergence (%)
49	3.5	0
50	3.5	0
51	3.5	0
52	3.5	0
53	3.5	0
54	3.5	0
55	3.5	0
56	3.5	0
57	3.5	0
58	3.5	0
59	3.5	0
60	3.5	0
61	3.5	0
62	3.5	0
63	3.5	0
64	3.5	0
65	3.5	0
66	3.5	0
67	3.5	0
68	3.5	0
69	3.5	0
70	3.5	0
71	3.5	0
72	3.5	0
73	3.5	0
74	3.5	0
75	3.5	0
76	3.5	0
(A)	3.5	0
Untreated	-	90

Test Example 2

Powdered animal feed (2 g) was thoroughly mixed with bran (14 g). An emulsifiable concentrate prepared according to Formulation Example 1 was diluted with water to a designed concentration, and the dilution was added to the above mixture. The resultant mixture was stirred well to make an artificial culture. Thirty larvae of housefly (Musca domestica) were reared therein until their pupation. The obtained pupae were placed into a plastic cup, and the rate of emergence was determined. According to the following equation, the emergence inhibition (%) was calculated:

$$\text{Emergence inhibition (\%)} = \left(1 - \frac{\text{Rate of emergence in treated plot}}{\text{Rate of emergence in untreated plot}}\right) \times 100$$

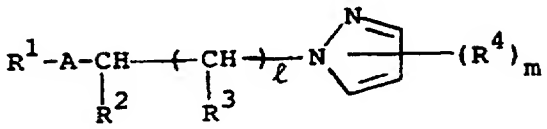
The results are shown in Table 5.

Table 5

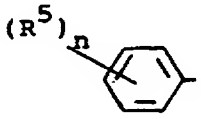
Test compound No.	Emergence inhibition (%)	
	3 ppm	1 ppm
1	100	100
2	100	88
15	91	58
76	100	88
(A)	60	13
(B)	40	0
(C)	5	0

Claims

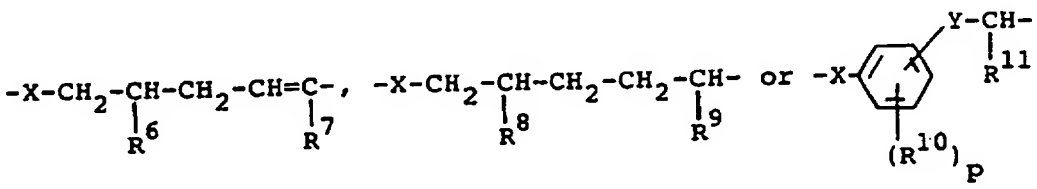
1. A pyrazole compound of the formula:



wherein
R^1 is a C_1-C_8 alkyl group, a C_2-C_8 alkenyl group or a C_3-C_8 alkynyl group, these groups being optionally substituted with halogen, hydroxy and/or C_1-C_6 alkoxy, or a group of the formula:

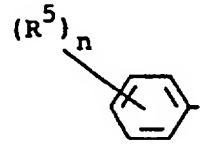


wherein R^5 is a hydrogen atom, a halogen atom, a hydroxy group, a cyano group, a nitro group, a C_1-C_4 alkyl group, a halo(C_1-C_4)alkyl group, a C_1-C_4 alkoxy group, a halo(C_1-C_4)alkoxy group, a C_1-C_4 alkylthio group, a halo(C_1-C_4)alkylthio group, a C_2-C_4 alkenyl group, a C_2-C_4 alkynyl group, a C_2-C_4 alkenyloxy group, a C_2-C_4 alkynyloxy group, a C_2-C_4 alkenylthio group, a C_2-C_4 alkynylthio group, a halo(C_2-C_4)-alkenyl group, a halo(C_2-C_4)alkynyl group, a halo(C_2-C_4)alkenyloxy group, a halo(C_2-C_4)alkynyloxy group or a halo(C_2-C_4)alkenylthio group and n is an integer of 1 to 5;
R^2 and R^3 are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group;
R^4 is a hydrogen atom, a halogen atom, a C_1-C_4 alkyl group or a halo(C_1-C_4)alkyl group;
A is either one of the formulas:

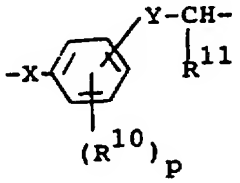


wherein R^6, R^7, R^8, R^9, R^{10} and R^{11} are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group, X is an oxygen atom, a sulfur atom, a methylene group, a carbonyl group, a sulfoxide group, a sulfonyl group or a single bond, Y is an oxygen atom, a sulfur atom or a methylene group and p is an integer of 1 to 4;
ℓ is an integer of 0 to 2; and
m is an integer of 1 to 3.

2. The compound according to claim 1, wherein R^1 is a group of the formula:

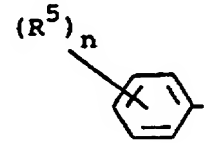


wherein R^5 is a hydrogen atom, a halogen atom, a hydroxy group, a cyano group, a nitro group, a C_1-C_4 alkyl group, a halo(C_1-C_4)alkyl group, a C_1-C_4 alkoxy group, a halo(C_1-C_4)alkoxy group, a C_1-C_4 alkylthio group, a halo(C_1-C_4)alkylthio group, a C_2-C_4 alkenyl group, a C_2-C_4 alkynyl group, a C_2-C_4 alkenyloxy group, a C_2-C_4 alkynyloxy group, a C_2-C_4 alkenylthio group, a C_2-C_4 alkynylthio group, a halo(C_2-C_4)-alkenyl group, a halo(C_2-C_4)alkynyl group, a halo(C_2-C_4)alkenyloxy group, a halo(C_2-C_4)alkynyloxy group or a halo(C_2-C_4)alkenylthio group and n is an integer of 1 to 5 and A is a group of the formula:

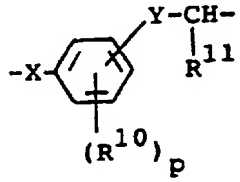


wherein R^{10} and R^{11} are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group, p is an integer of 1 to 4, X is an oxygen atom, a sulfur atom, a methylene group, a carbonyl group, a sulfoxide group, a sulfonyl group or a single bond and Y is an oxygen atom, a sulfur atom or a methylene group.

3. The compound according to claim 1, wherein R^1 is a group of the formula:

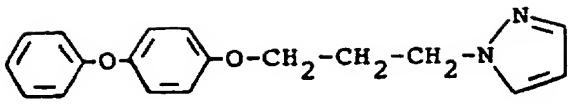


wherein R^5 is a hydrogen atom, a halogen atom or a C_1-C_4 alkyl group and n is an integer of 1 to 5 and A is a group of the formula:

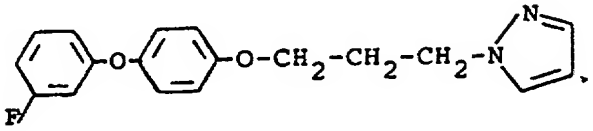


wherein R^{10} and R^{11} are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group, p is an integer of 1 to 4, X is an oxygen atom or a methylene group and Y is an oxygen atom substituted at the p-position in regard to X and ℓ is an integer of 0 or 1.

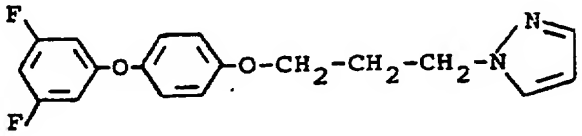
4. The compound according to claim 1, which has the formula:



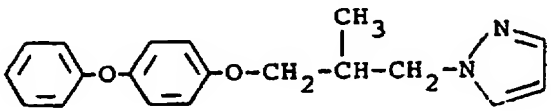
5. The compound according to claim 1, which has the formula:



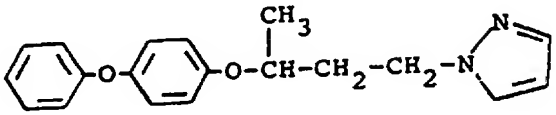
6. The compound according to claim 1, which has the formula:



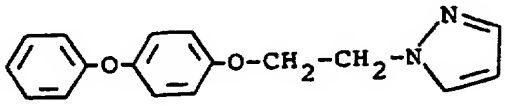
7. The compound according to claim 1, which has the formula:



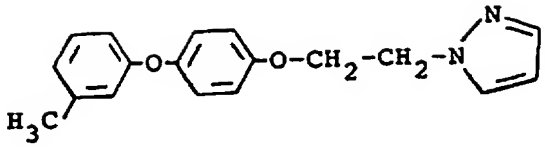
8. The compound according to claim 1, which has the formula:



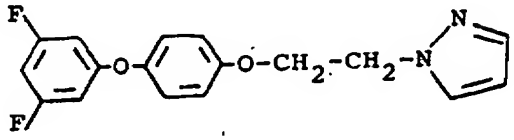
9. The compound according to claim 1, which has the formula:



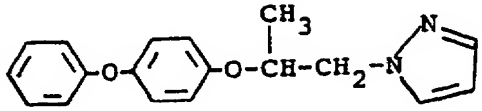
10. The compound according to claim 1, which has the formula:



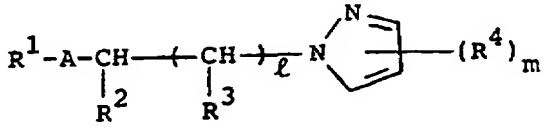
11. The compound according to claim 1, which has the formula:



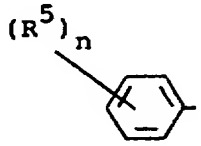
12. The compound according to claim 1, which has the formula:



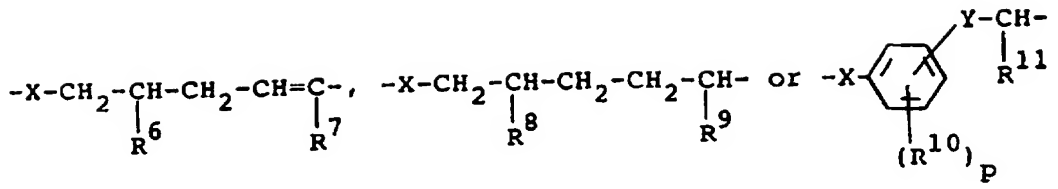
13. A process for preparing a pyrazole compound of the formula:



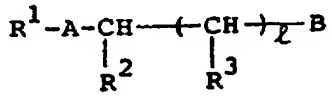
wherein
R^1 is a C_1-C_8 alkyl group, a C_2-C_8 alkenyl group or a C_3-C_8 alkynyl group, these groups being optionally substituted with halogen, hydroxy and/or C_1-C_6 alkoxy, or a group of the formula:



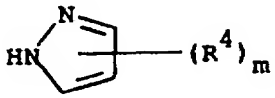
wherein R^5 is a hydrogen atom, a halogen atom, a hydroxy group, a cyano group, a nitro group, a C_1-C_4 alkyl group, a halo(C_1-C_4)alkyl group, a C_1-C_4 alkoxy group, a halo(C_1-C_4)alkoxy group, a C_1-C_4 alkylthio group, a halo(C_1-C_4)alkylthio group, a C_2-C_4 alkenyl group, a C_2-C_4 alkynyl group, a C_2-C_4 alkenyloxy group, a C_2-C_4 alkynyloxy group, a C_2-C_4 alkenylthio group, a C_2-C_4 alkynylthio group, a halo(C_2-C_4)-alkenyl group, a halo(C_2-C_4)alkynyl group, a halo(C_2-C_4)alkenyloxy group, a halo(C_2-C_4)alkynyloxy group or a halo(C_2-C_4)alkenylthio group and n is an integer of 1 to 5;
R^2 and R^3 are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group;
R^4 is a hydrogen atom, a halogen atom, a C_1-C_4 alkyl group or a halo(C_1-C_4)alkyl group;
A is either one of the formulas:



wherein R^5, R^7, R^8, R^9, R^{10} and R^{11} are, the same or different, each a hydrogen atom, a halogen atom or a C_1-C_3 alkyl group, X is an oxygen atom, a sulfur atom, a methylene group, a carbonyl group, a sulfoxide group, a sulfonyl group or a single bond, Y is an oxygen atom, a sulfur atom or a methylene group and p is an integer of 1 to 4;
ℓ is an integer of 0 to 2; and
m is an integer of 1 to 3, which comprises reacting a compound of the formula:



wherein R^1, R^2, R^3, A and are each as defined above and B is a halogen atom, a mesyloxy group or a tosyloxy group with a compound of the formula:



wherein R^4 and m are each as defined above.

14. A pesticidal composition which comprises as an active ingredient the pyrazole compound according to any one of claims 1 to 12 and an inert carrier or diluent.

15. A method for controling pests which comprises applying a pesticidally effective amount of the pyrazole compound according to any one of claims 1 to 12 to pests.

16. Use of the pyrazole compound according to any one of claims 1 to 12 as a pesticide.

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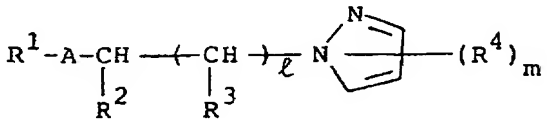
(54) **Pyrazole compounds, and their production and use.**

(57) A pyrazole compound of the formula:



, which is useful as a pesticide.

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EUROPEAN SEARCH REPORT

Application Number

EP 89 31 3324

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	CHEMICAL ABSTRACTS, vol. 91, 1979, page 590, abstract no. 74523y, Columbus, Ohio, US; H.J.M. DOU et al.: "Phase transfer catalysis in the azole series: N-alkylation of pyrazole", & AN. QUIM. 1978, 74(7-8), 1137-9 * Abstract *	1,13	C 07 D 231/12 C 07 D 231/16 A 01 N 43/56
P,X	CHEMICAL ABSTRACTS, vol. 111, 1989, pages 715-716, abstract no. 205323q, Columbus, Ohio, US; & JP-A-01 55 557 (FUJI PHOTO FILM CO., LTD) 02-03-1989 * Abstract *	1	
X	CHEMICAL ABSTRACTS, vol. 101, 1984, page 47, abstract no. 8350p, Columbus, Ohio, US; & JP-A-59 15 469 (CEMEDINE CO., LTD) 26-01-1984 * Abstract *	1	
X	CHEMICAL ABSTRACTS, vol. 107, 1987, page 2, abstract no. 23735k, Columbus, Ohio, US; V.V. TSERUNYAN et al.: "Synthesis and polymerization of substituted 4-vinylpyrazoles", & ARM. KHIM. ZH. 1987, 40(1), 48-54 * Abstract *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5) C 07 D 521/00 C 07 D 231/00
X	CHEMICAL ABSTRACTS, vol. 108, 1988, page 138, abstract no. 134239s, Columbus, Ohio, US; & JP-A-63 273 007 (OSAKA SODA CO., LTD) 27-11-1987 * Abstract *	1	
X	CHEMICAL ABSTRACTS, vol. 109, 1988, page 257, abstract no. 50259f, Columbus, Ohio, US; & JP-A-63 02 904 (S.S. PHARMACEUTICAL CO., LTD) 07-01-1988 * Abstract *	1,14	

-/-

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 October 91	FRANCOIS J.C.L.

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T: theory or principle underlying the invention

E: earlier patent document, but published on, or after the filing date
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EUROPEAN SEARCH REPORT

Application Number

EP 89 31 3324

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 262 344 (MEDICE) * Page 20, no. 13; page 81, claim 94 *	1	
X	US-A-3 190 888 (M. WOLF et al.) * Columns 1-4, examples II,IV,VI,VIII *	1,13	
A	EP-A-0 069 848 (BAYER) * Pages 1,10,11,21-25; claims *	1,13-16	
E	WO-A-9 006 678 (REGENTS OF UNIVERSITY OF ARIZONA) * Whole document *	1-16	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 October 91	FRANCOIS J.C.L.

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D: document cited in the application
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